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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/534,633	05/11/2005	Avto Tavkhelidze	12091	8643

7590 10/23/2006  
Borealis Technical  
23545 NW Skyline Blvd  
North Plains, OR 97133-9205

EXAMINER

LIU, BENJAMIN T

ART UNIT PAPER NUMBER

2826

DATE MAILED: 10/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/534,633	Applicant(s) TAVKHELIDZE ET AL.	
	Examiner Benjamin T. Liu	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

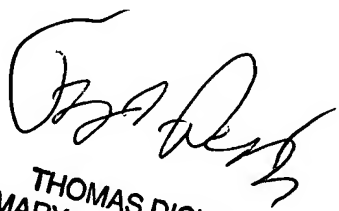
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 August 2006.
- 2a) ☒ This action is **FINAL**.      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

  
**THOMAS DICKEY**  
 PRIMARY PATENT EXAMINER

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection.

### *Claim Rejections - 35 USC § 102(b)*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6-10, and 12-14 are rejected under 35 U.S.C 102(b) as being anticipated by Huffman (3,169,200).

With regard to claim 1, figure 4 of Huffman discloses a thermotunneling device comprising a collector electrode 39 and an emitter electrode 30 the collector electrode 39 having a surface facing the emitter electrode 30, characterized in that an insulator layer (OXIDE SPACERS), covers the surface of the collector electrode 39.

With regard to claim 2, figure 4 of Huffman discloses the insulator layer (OXIDE SPACERS) comprises a metal oxide.

With regard to claim 3, figure 4 of Huffman discloses the metal oxide is aluminum oxide. (Note line 75 in column 4 of Huffman)

With regard to claim 4, figure 4 of Huffman discloses the distance between the electrodes is in the range of 10 - 200A. (Note claim 1 of Huffman)

With regard to claim 6, figure 4 of Huffman discloses the emitter electrode 30 comprises a metal.

With regard to claim 7, figure 4 of Huffman discloses the collector electrode 39 comprises a metal.

With regard to claim 8, figure 4 of Huffman discloses a method for enhancing electron tunneling between an emitter 30 and collector electrode 39, the collector electrode 39 having a surface facing the emitter electrode 30 comprising the step of covering the surface of the collector electrode 39 with an insulator (OXIDE SPACERS).

With regard to claim 9, figure 4 of Huffman discloses the insulator layer (OXIDE SPACERS) comprises a metal oxide.

With regard to claim 10, figure 4 of Huffman discloses the metal oxide is aluminum oxide. (Note line 75 in column 4 of Huffman)

With regard to claim 12, figure 4 of Huffman discloses placing the collector electrode 39 between 10 and 200Å from the emitter electrode 30.

With regard to claim 13, figure 4 of Huffman discloses the emitter electrode 30 comprises a metal.

With regard to claim 14, figure 4 of Huffman discloses the collector electrode 39 comprise a metal.

***Claim Rejections - 35 USC § 102(e)***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 15-17 and 20-21 rejected under 35 U.S.C 102(e) as being anticipated by Sung (2003/0168957).

With regard to claim 15, figure 2 of Sung discloses a method for cooling comprising the steps: applying a bias voltage to an emitter electrode 30; placing a collector electrode 25 a distance  $d_0$  from the emitter electrode 30; placing an insulator layer 5 a distance  $d_1$  from the emitter electrode 30, wherein  $d_1$  is greater than zero; and contacting the insulator layer 5 and the collector layer 25, whereby electrons tunneling from the emitter electrode 30 to the collector electrode 25 and the emitter electrode 30 thereby cooling the emitter electrode 30. (Note abstract of Sung)

With regard to claim 16, figure 2 of Sung discloses  $d_0$  is in the range of 10 - 200Å. (Note abstract of Sung)

With regard to claim 17, figure 2 of Sung discloses  $d_1$  is in the range of 5 - 50Å. (Note abstract of Sung)

With regard to claim 20, figure 2 of Sung discloses the emitter electrode 30 comprises a metal.

With regard to claim 21, figure 2 of Sung discloses the collector electrode 25 comprises a metal.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5 and 11 are rejected under 35 U.S.C 103(a) as being unpatentable over Huffman (3,169,200) in view of Sung (2003/0168957).

With regard to claim 5, Huffman discloses all the subject matter claimed except for the distance between the emitter and the insulator layer is in the range of 5 - 50A.

However, figure 2 of Sung disclose a vacuum 35 in between the electrodes (25, 30). (Note lines 10-11 in abstract of Sung)

Therefore, it would have been obvious to one of ordinary skill in the art to form the electrodes of Martinovsky et al with a distance in between as taught by Sung in order to enhance tunneling of higher energy electrons.

With regard to claim 11, Huffman discloses all the subject matter claimed except for placing the insulator between 5 and 50A from the emitter electrode

However, figure 2 of Sung disclose a vacuum 35 in between the electrodes (25, 30). (Note lines 10-11 in abstract of Sung)

Therefore, it would have been obvious to one of ordinary skill in the art to form the electrodes of Martinovsky et al with a distance in between as taught by Sung in order to enhance tunneling of higher energy electrons.

Claims 18-19 are rejected under 35 U.S.C 103(a) as being unpatentable over Sung (2003/0168957) in view of Huffman (3,169,200).

With regard to claim 18, Sung discloses all the subject matter claimed except for the insulator layer comprising a metal oxide.

However, figure 4 of Huffman discloses an insulator layer (OXIDE SPACER) comprising a metal oxide.

Therefore, it would have been obvious to one of ordinary skill in the art to form the device Sung with the insulator of Huffman in order to enhance tunneling between electrodes.

With regard to claim 19, Sung discloses all the subject matter claimed except the metal oxide is aluminum oxide.

However, figure 4 of Huffman discloses the metal oxide is aluminum oxide.  
(Note lines 75 in column 4 of Huffman)

Therefore, it would have been obvious to one of ordinary skill in the art to form the device Sung with the insulator of Huffman in order to enhance tunneling between electrodes.

### ***Conclusion***

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin T. Liu whose telephone number is (571) 272-6009. The examiner can normally be reached on Mon-Fri 9:30 AM-6:00AM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on 571 272 1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

BTL

10/15/2006